

# **ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN**

Renewable Energy Working Group  
Illinois Commerce Commission  
Chicago, April 5, 2005

# ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN



## STRENGTHS

- **NON-POLLUTING ELECTRICITY**
- **PEAK POWER ELECTRICITY**
- **HIGHLY DISTRIBUTIVE ELECTRICITY**
- **LOW MAINTENANCE ELECTRICITY**
- **MATURE AND GROWING TECHNOLOGY**
- **ECONOMIC DEVELOPMENT POTENTIAL**

## WEAKNESSES

- **"CLOUDY" PERCEPTION**
- **HIGHER COMPARATIVE COST**



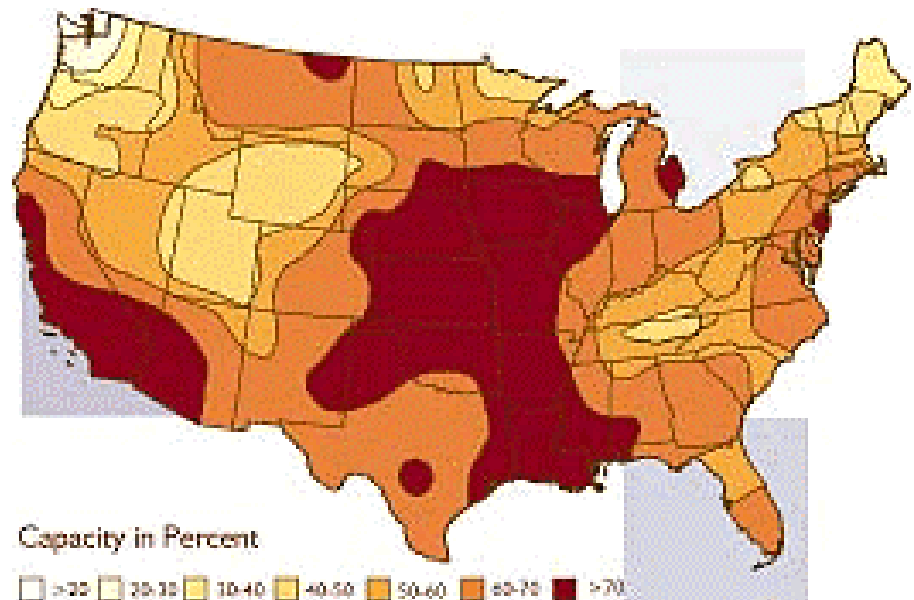
# ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN



## Peak Power Electricity

- **Illinois among the highest match of peak power electric need and photovoltaic power availability**
- **ELCC = Electric Load Carrying Capacity (source National Renewable Energy Laboratory)**

**(SOURCE: Natl Renewable Energy Lab)**



PV ELCC map of U.S. (based on 500 utility loads)



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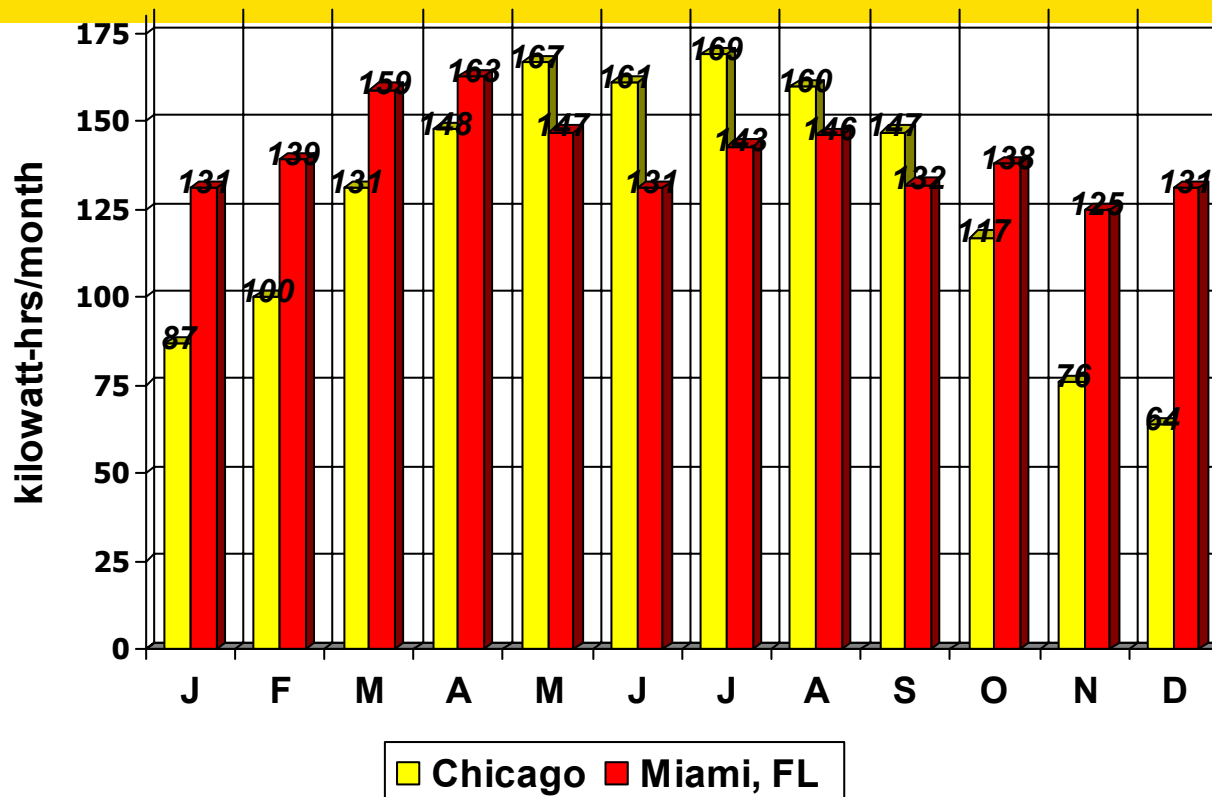
## **Peak Power Electricity**

- **VALUE OF LOAD REDUCTION**
  - **AVERAGE - \$100/MWh – 58% Above Baseload**
  - **SUMMER - \$250/MWh – 460% times market price**
    - Access needed to power pools like PJM
    - “PV Saves for All Ratepayers: Mid-Atlantic States Cost Curve Analysis 9/2002, JBS Energy
- **VALUE TO PEAK ELECTRICITY IN POST-2006 REGULATORY ENVIRONMENT**
  - **Higher prices for Summer as well as daytime**

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## "Cloudy" Perception



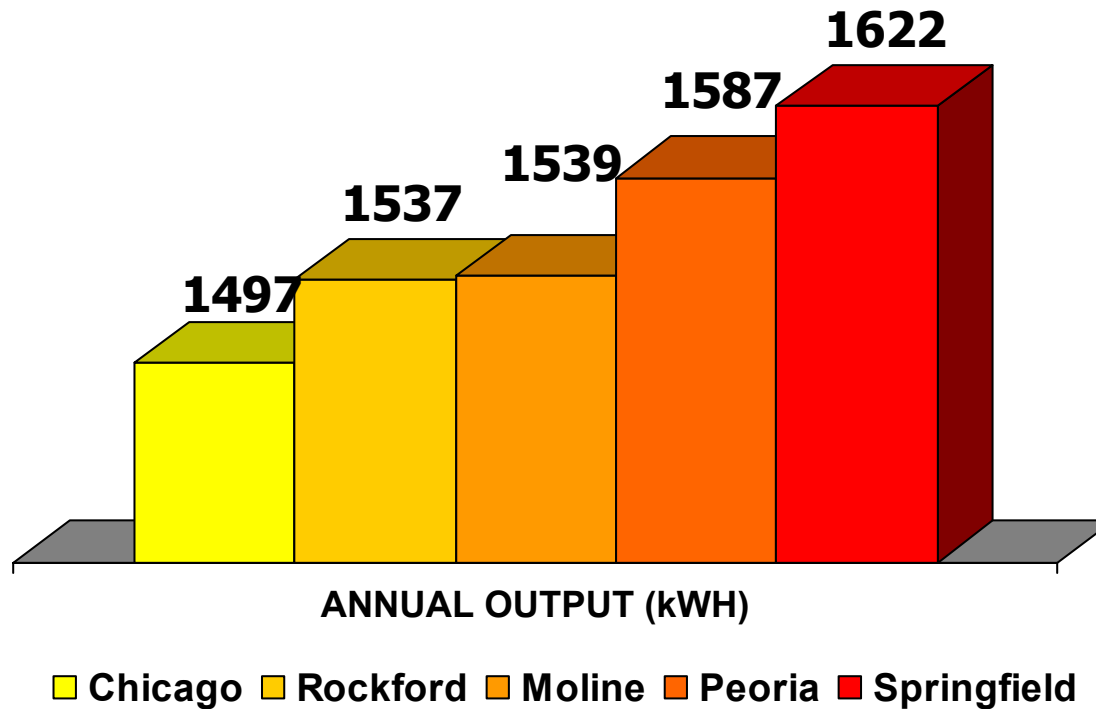
PVWATTS simulation – Natl Renewable Energy Lab, 1 kW AC, 30 degrees fixed angle due south

A solar electric system will work about as well in *Chicago* as one in Miami, Florida, around **88%**. A Chicago system can out-produce a Miami system in the summer.

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## "Sunnier Away From The Lake"



PVWATTS simulation – Natl Renewable Energy Lab, 1 kW AC, 30 degrees fixed angle due south

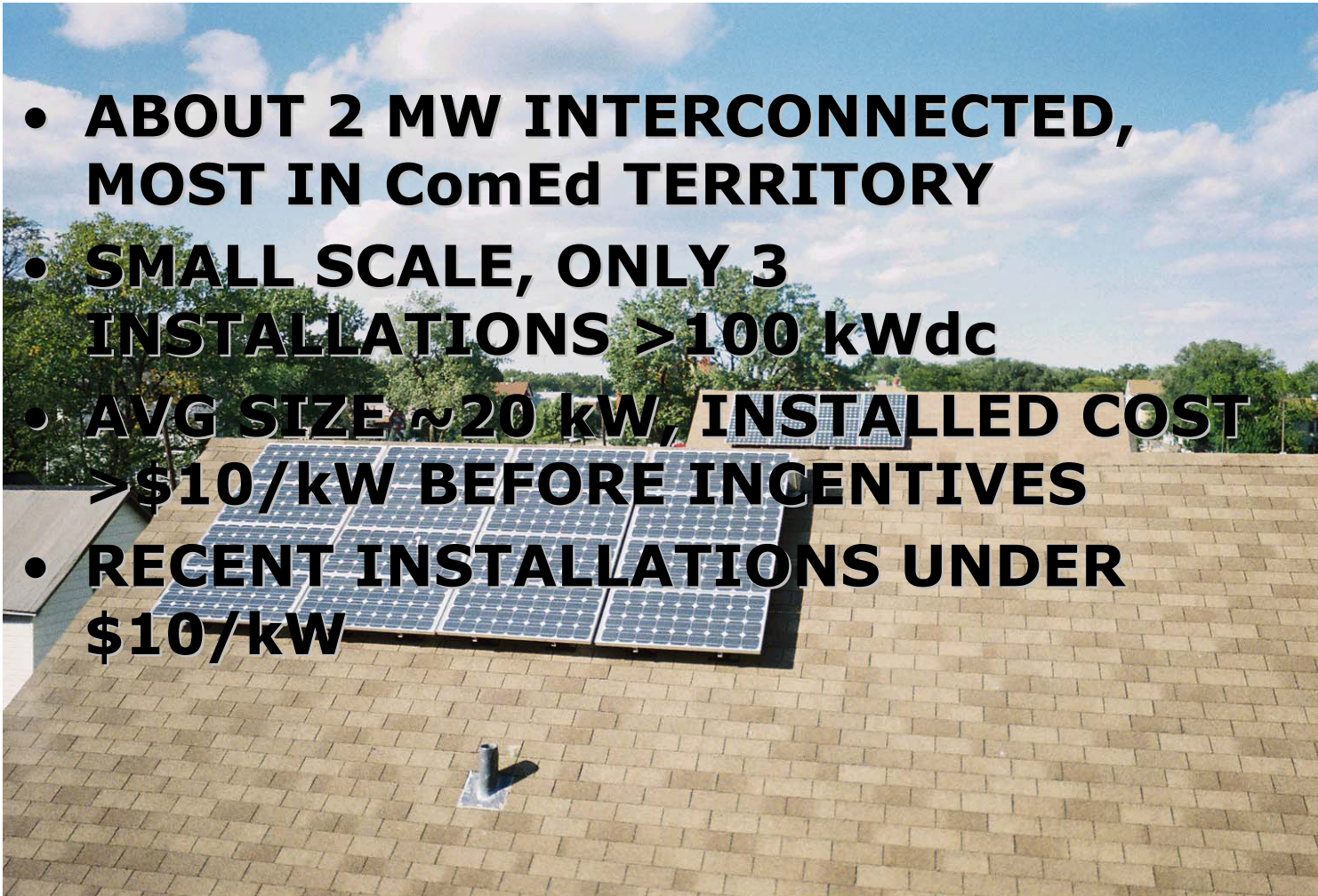
Other Illinois sites may be more productive than Chicago because of the “lake effect”.

# ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN



## HISTORY OF PV IN ILLINOIS SINCE 1999

- **ABOUT 2 MW INTERCONNECTED, MOST IN ComEd TERRITORY**
- **SMALL SCALE, ONLY 3 INSTALLATIONS >100 kWdc**
- **AVG SIZE ~20 kW, INSTALLED COST >\$10/kW BEFORE INCENTIVES**
- **RECENT INSTALLATIONS UNDER \$10/kW**



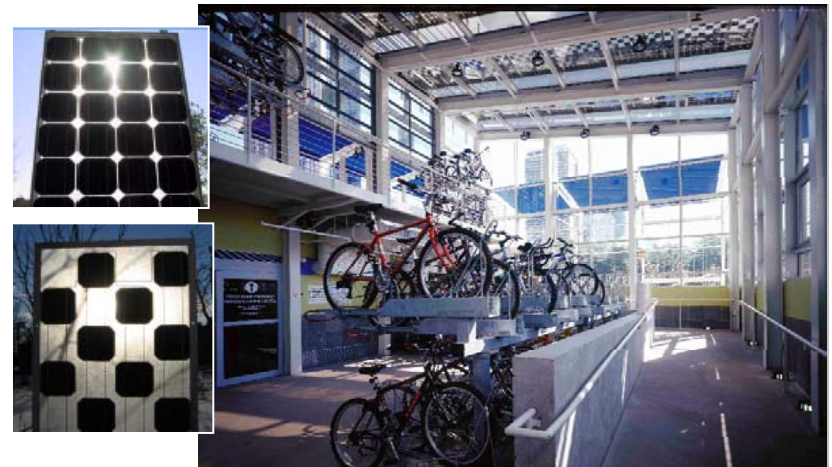


# ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN



## SMALL SCALE IS BEAUTIFUL

- IL has one of largest US small scale PV markets outside of Sunbelt
- Building Integrated Photovoltaics (BIPV) is a promising growth market
  - Replace curtain walls, canopies, windows, awnings, etc. with clean power generation
  - Market can eventually total hundreds of thousands of square feet in Illinois, 5-10 MW of capacity by 2012
  - Cost reduction of replacing building materials and design elegance makes BIPV appealing



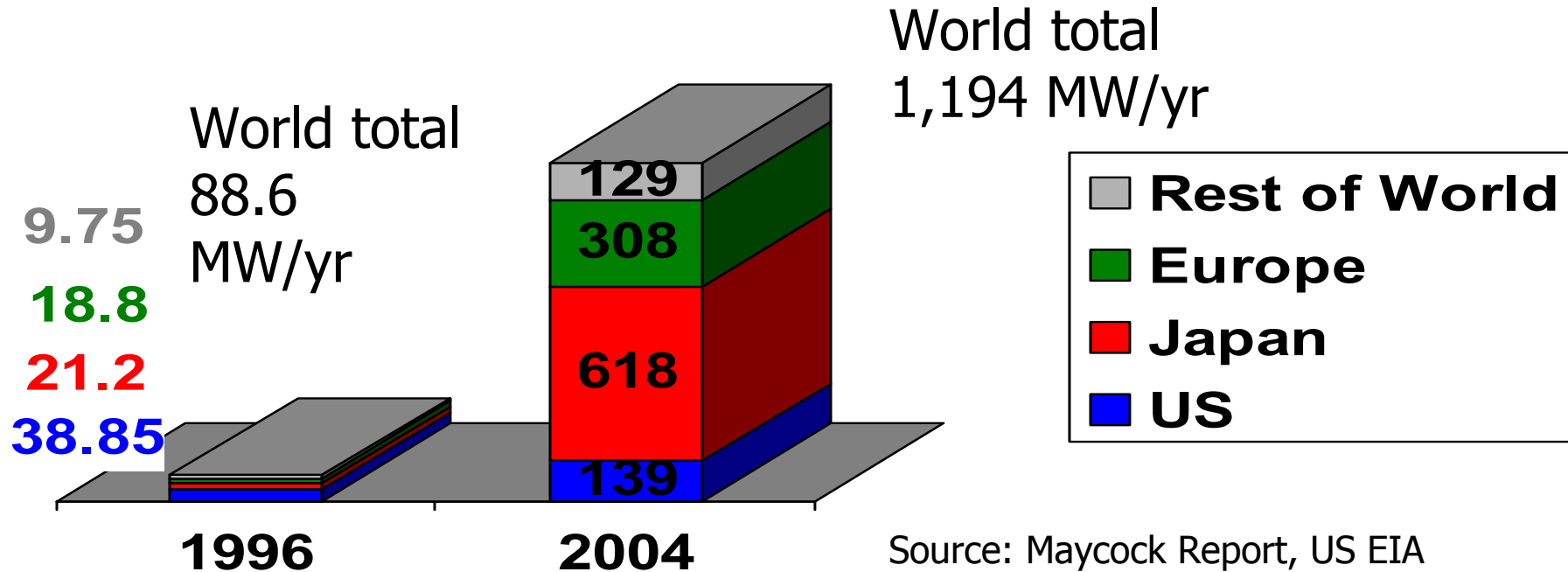


# ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN



## PHOTOVOLTAIC MARKET HAS NEAR EXPONENTIAL GROWTH

### World Annual Photovoltaic Production - Peak MW

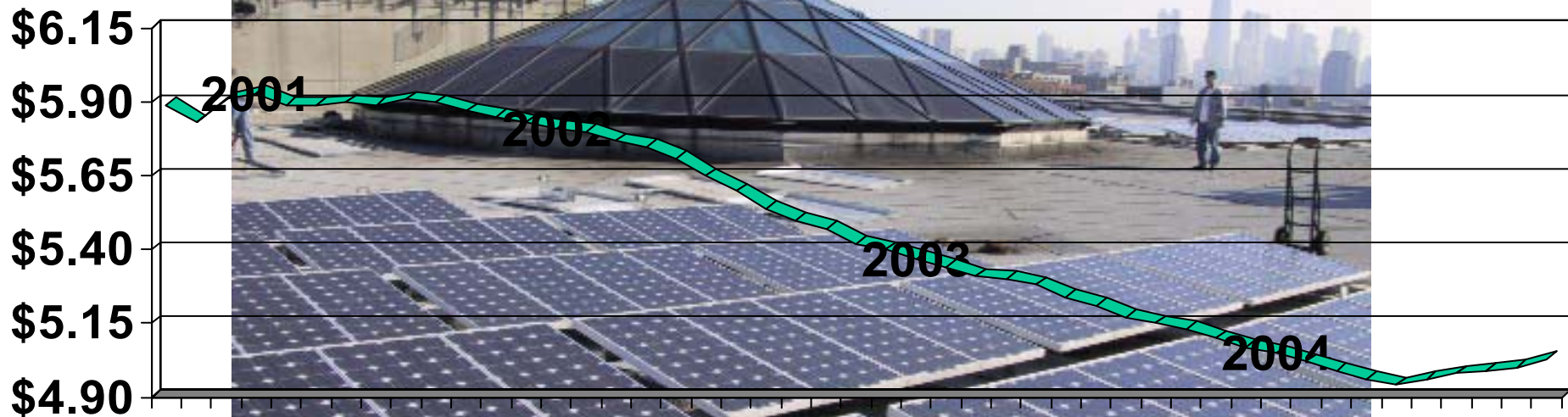


# ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN



**THIS GROWTH HAS CAUSED PRICE DECLINES TO SLOW**

## Declining cost of solar electric panels



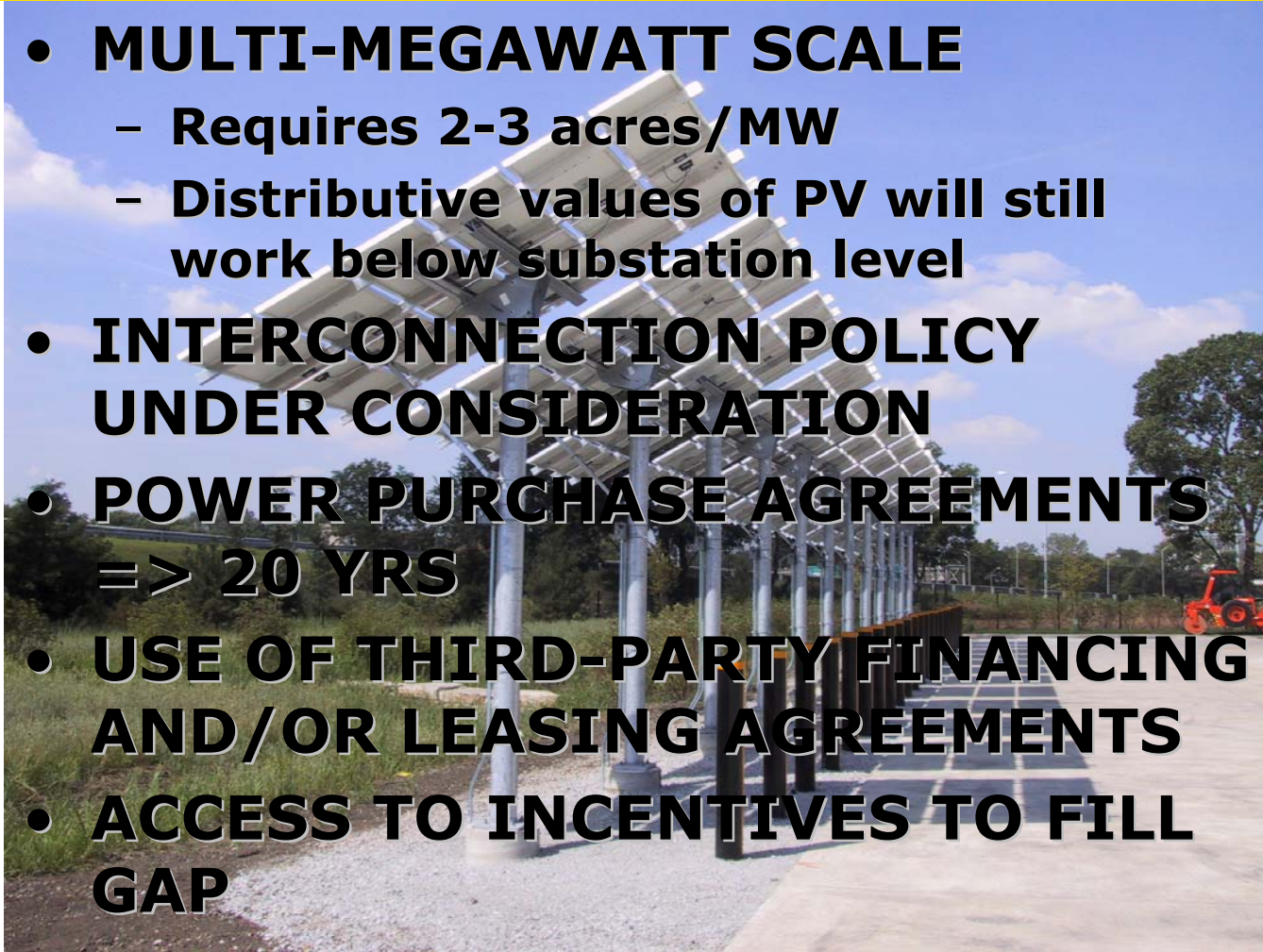
**Panels drop ~7%/yr, Systems drop  
~4%/yr in sustained markets** (Source:  
Solarbuzz, Inc)

# ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN



## WHAT IS NEEDED FOR SIGNIFICANT PV MARKET?

- **MULTI-MEGAWATT SCALE**
  - Requires 2-3 acres/MW
  - Distributive values of PV will still work below substation level
- **INTERCONNECTION POLICY UNDER CONSIDERATION**
- **POWER PURCHASE AGREEMENTS => 20 YRS**
- **USE OF THIRD-PARTY FINANCING AND/OR LEASING AGREEMENTS**
- **ACCESS TO INCENTIVES TO FILL GAP**





# **ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN**



## **WHAT IS NEEDED FOR SIGNIFICANT PV IMPACT?**

|  |   |
|--|---|
| <b>ILLINOIS SUSTAINABLE<br/>ENERGY PLAN</b>  | <b>8% of electricity generated<br/>from renewable energy sources<br/>2% from non-wind sources</b> |
| <b>Illinois electricity generated in<br/>2002 (USEIA State Electricity Profiles<br/>2002 Table 1. Summary Studies)</b> | <b>188,054,449 MWh</b>  |
| <b>0.1% to be generated by<br/>photovoltaic systems by 2012</b>  | <b>188,054 MWh</b>  |
| <b>Capacity required @<br/>1497/MWh-MWac</b>   | <b>126 MW peak AC</b>   |
| <b>0.2% generated by 2012</b>  | <b>252 MW peak AC</b>   |
| <b>0.5% generated by 2012</b>  | <b>630 MW peak AC</b>   |



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## WHERE WOULD THESE SYSTEMS GO?

- Open lands not impacted
- Brownfields
- Right-of-ways
- Landfills
- Parking lots
- Power plant buffer zones
- @ 2-3 acres/MWac, need 250-2000 acres, or 1/2 to 3 square miles
- Proximity to transmission at or below substation level



# ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN



## INSTALLATIONS ON A MULTI-MEGAWATT SCALE


| 1 MEGAWATT AC PV SYSTEM DELIVERING 1,400 MWH AVG YEAR |             |          |          |                                    |
|---|-------------|----------|----------|------------------------------------|
| COST/MW<br>\$MM                                       | \$ COST/MWH |          |          | FINANCING                          |
|   | 10 Yrs      | 20 Yrs   | 30 Yrs   |                                    |
| \$8   | \$571.40    | \$285.71 | \$190.48 | INSTALLED<br>WITHOUT<br>INCENTIVES |
| \$7   | \$500.00    | \$250.00 | \$166.67 |                                    |
| \$6   | \$428.57    | \$214.29 | \$142.86 |                                    |
| \$5   | \$357.14    | \$178.57 | \$119.05 | TAX CREDITS,<br>DEPRECIATION       |
| \$4   | \$285.71    | \$142.86 | \$95.24  |                                    |
| \$3   | \$214.29    | \$107.15 | \$71.43  |                                    |



# ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN



## WHAT WOULD BE EMPLOYMENT IMPACT?

| NUMBER OF JOB-YEARS CREATED FOR FIVE YEAR PERIOD  |  | SCENARIOS OF % OF ELECTRICITY FROM PV BY 2012 |       |       |
|---|--|---|-------|-------|
|   |  | 0.1%  | 0.2%  | 0.5%  |
| # MWs 5-yr period   |  | 126   | 252   | 630   |
| #MWs/yr   |  | ~25   | ~50   | ~125  |
| Jobs-yrs in design, contract and service per yr   |  | 397   | 794   | 1,985 |
| Include job-yrs in panel and component manufacturing  |  | 767   | 1,534 | 3,835 |
| Include job-yrs in cell and basic material manufacturing                                      |  | 887   | 1,774 | 4,435 |
| Renewable Energy Policy Project "The Work That Goes Into Renewable Energy, 1999, www.repp.org |  |   |       |       |



**THANK YOU!**



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